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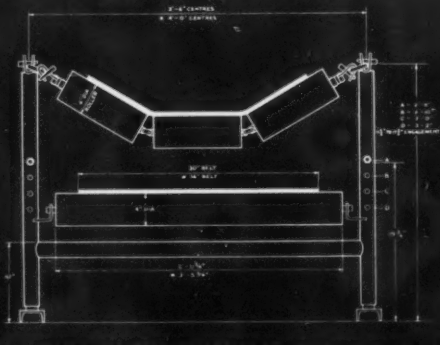

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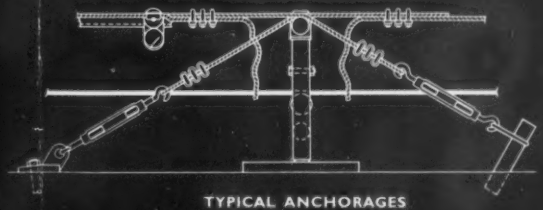

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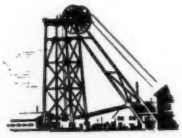

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The Mining Journal

London, February 27, 1959

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Mining Submarine Ores

MUCH interest has been roused by the prediction of Dr. Hugh Odishaw, executive director of the U.S. committee for the recently concluded International Geophysical Year, that "the oceans can become serious competitors of the continents in terms of material resources".

Last year an I.G.Y. expedition charted vast submerged fields of metal-bearing rocks or nodules off the south-eastern U.S. coast and on the Pacific floor between South America and Tahiti. According to current assessments of this find (which, at this stage, are obviously in the nature of "guesstimates"), 198,000,000,000 tons of rock-like nodules containing manganese, cobalt, copper and nickel are strewn across some 14,000,000 sq. miles of the ocean bottom. Estimates that the southern Pacific mineral riches may be worth something in the region of $1,500,000 per sq. mile are reported to have aroused interest on the part of such large companies as Freeport Sulphur Co. and Union Carbide Corporation.

Mr. John L. Mero, a graduate research engineer at the University of California, states that the nodules range in size from tiny pebbles near the coast to 5 ft. boulders in mid-ocean. On the basis of his samples, Mr. Mero considers that the ore would yield no less than 40,000,000,000 tons of manganese and 1,000,000,000 tons each of nickel, copper and cobalt.

Some research workers believe that, even though much of the ore lies beneath 15,000 ft. of water, mining of these deep-sea deposits is economically feasible. According to one investigator, the ore-bearing nodules could be sucked up to the surface and processed for no more than $25 to $35 a ton, plus a few dollars per ton for transportation. Such cost estimates, if they proved to be accurate, would leave ample margin for profit! Obviously the first requirement, if minerals are to be won economically from the ocean floor, is to develop economic and dependable methods for the evaluation and finally the exploitation of deposits. The "Orient Explorer", to which so much publicity has recently been accorded as the first mobile off-shore drilling platform to be constructed in the U.K., is essentially an oil-drilling rig, and it seems unlikely that this type of equipment could be adapted to the search for minerals on the ocean bed. Possibly ore deposits just off-shore, as in certain areas of Cornwall, might best be exploited by diamond drilling and distance cross-cutting from a shaft sunk on the land. This method would appear to have particular advantages when searching for lodes of the Cornish type in which ores are often irregularly distributed.

It might be necessary to consider drilling through the bed of the ocean to explore a bedded deposit, in which case many holes would have to be drilled. Perhaps, it might be possible to develop a diamond drill which could be operated by a diver from the actual sea bed. Alternatively, drilling might be controlled by an operator located inside a metal sphere of the bathysphere type that could be lowered to the sea bottom for the operation. An arrangement such as this should enable holes to be drilled quickly. The areas to be drilled would be selected after the overall locality had been geophysically surveyed.

It will also be necessary to devise some adequate method of sampling ore lying at the sea bed. In shallow and calm waters this can be accomplished by Banka drilling, but in the deeper waters off Phuket, in Thailand, such operations proved to be impossible and sampling was carried out by means of a grab.

In other parts of the world various gadgets have been used to take off-shore samples, but all these methods are of limited efficiency since they can sample only the uppermost 5 ft. or 6 ft. of submarine alluvium. All work on the "apple corer" principle. Bristol University has used such apparatus to take samples in the English Channel.

Commercial ventures in submarine mining are hardly likely to be embarked upon until further investigation has been undertaken. So far as the technical problems are concerned, it may be anticipated that, as in other fields of endeavour, these will be surmounted if and when the incentive becomes sufficiently great, however formidable they may now appear.

BRITISH COMPANY MAY EXPORT UNDERGROUND GAS KNOW-HOW

The National Coal Board have announced that, from May 31, 1959, further experimental work at Newman Spinney on the gasification of coal underground will cease. This work was completed on thin and faulted seams which would not be mined by normal practice. Indeed, it has been calculated that if development were successful, gas from such seams—used to run a generating station—would cost about 3d. a therm. This is only just competitive with normal methods of producing power, and in present circumstances in this country the Board have felt that continued experimental and development work would not be justified.

Several countries overseas are known to have coal deposits in which underground gasification would have better chances of economic success than the thin seams on which it has been developed in this country.

Humphreys and Glasgow Ltd., the company which has been in charge of the project for the National Coal Board since March, 1957, may now be able to introduce the process in some of these countries. A number of enquiries have been received already.

The company has announced that much experimental work has been done, and gas is due to be delivered shortly to the pilot plant at Newman Spinney. Two methods are being used, one developed entirely in Britain, and the other adapted from a Russian system as a result of the exchange of visits by experts of the two countries last year. The company is confident that in favourable geological conditions, gas produced underground could be competitive with any other form of power station fuel.

TRENDS IN THE CANADIAN MINING INDUSTRY

The fact that for the first time in many years the dollar value of Canada's mineral output in 1958 was somewhat reduced from previous peaks reflects the circumstances which faced the industry for the past twelve months, states Mr. V. C. Wansbrough, vice-president and managing director of the Canadian Metal Mining Association, in his annual report for 1958.

The preliminary figure of $2,133,153,000 for 1958 shows a decline of 3 per cent from the record production of 1957. The value of metals produced in 1958 is estimated at $1,142,140,000, a decrease of only 1.5 per cent over that of the previous year. This is a very creditable result in view of the depressed prices of base metals in particular.

In terms of dollar value uranium became Canada's leading metal, with an estimated value in 1958 of $290,228,000, more than double the figure of the previous year, $136,304,000.

The value of nickel output fell from $258,977,000 in 1957 to $196,734,000 in 1958, partly because of planned reduction of output and partly from a strike affecting the operations of our major producer. Corresponding declines, mostly on a modest scale, are recorded in the report.

As the premium on the Canadian dollar stood at a somewhat lower average in 1958, the gold mines reaped a comparative benefit, and the value of Canada's gold production rose from $148,757,000 (1957) to $154,065,000.

In the field of non-metallics, asbestos production declined from $104,489,000 (1957) to $96,168,000 (1958).

In general it may be said that 1958 was a year of adjustment and consolidation. The mining industry naturally shared in the general quieter tempo of economic activity and in the somewhat reduced level of production.

Towards the end of the year, however, there were unmistakable signs of an upswing. Exploration, prospecting and claim-staking were being vigorously prosecuted. Areas such as Mattagami and Chibougamau in north-western Quebec excited considerable interest, and in British Columbia the Department of Mines reported greater activity in staking claims. Also in Quebec a start was made on the very extensive preparation and development of the iron ore deposits of Quebec Cartier Mining Co., in which some $250,000,000 will be invested.

Gold mining benefited not only by a somewhat higher average Mint price for gold but by the 25 per cent increase in payments under the Emergency Gold Mining Assistance Act, which is effective for the current term of the Act which remains in force until the end of 1960.

Lead and zinc producers found themselves confronted by problems induced by the imposition of import quotas by the U.S. Government. The prices of these metals had fallen sharply as a consequence of oversupply, resulting, at least in large part, from the decision of the U.S. Administration to discontinue stockpiling.

Two international conferences, convened under the auspices of the United Nations, were held, one in London and the other in Geneva, to consider what steps might be taken to stabilize output and prices. Proposals advanced and supported by many countries represented at the conferences, suggesting curtailment of production and exports by multilateral agreements, were not acceptable either to the Canadian Government or to the Canadian industry. The situation is receiving further study by a continuing committee of the United Nations, and a further conference is to be called at an early date.

One of the principal highlights of the year was the approach of the uranium industry in Canada to almost complete productive capacity. Three companies in the Elliot Lake area of the Algoma basin, Milliken Lake Uranium Mines Ltd., Stanleigh Uranium Mining Corp. Ltd., and Stanrock Uranium Mines Ltd. began production, while Northspan Uranium Mines Ltd. put into operation its two remaining mills.

In northern Manitoba Sherritt Gordon Mines Ltd. began an expansion programme for mine and plant with the objective of raising capacity to 3,500 tons a day in 1959.

The major development and construction programme of International Nickel at Thompson Lake was continued. This project includes the construction of a townsite for an initial population of 8,000 people, and a large concentrator and smelter.

One further general consideration about the economic climate in Canada during 1958, a condition which is carrying over into 1959, deserves mention and emphasis. This is the very odd phenomenon of recession (as exemplified in unemployment) and inflation (as demonstrated in continued price increases) occurring and proceeding together.

For the mining industry as for the economy as a whole, continued inflationary pressures at this time are very dangerous indeed. Competition for world markets is keener now than it has been since before the Second World War. Other mineral-producing countries, many with wage-rates and wage-costs only a fraction of our own, are rapidly developing their resources. For several years past the competitive ability of Germany, Japan and other countries in manufactured goods and machinery has been clearly demonstrated. Canada's largest market, the United States, is being contracted under measures imposed by the U.S. Administration, in response to pressures brought to bear upon it by domestic producers who see higher protection as their hope of salvation.

We have constantly to remind ourselves and our governments that the Canadian mining industry is dependent on export trade and that mineral resources are only mineral resources if they can be economically developed and mined.

When the costs of production rise above the level where economic operation is possible, mining stops and our potential mineral wealth becomes valueless. It is, therefore, with considerable concern that we watch the march of inflationary forces. And when these are oddly and ill matched with continuing unemployment the situation becomes doubly serious. A concerted and determined effort to reduce production costs and at least to hold the line on the major items of cost is rapidly becoming a condition of the continued welfare of the mining industry in Canada.

INDUSTRY WILL USE MORE SILVER

The prediction that, because of its unique physical and chemical properties, silver will continue to find expanding markets in industry has been made by Mr. Ralph L. Wilcox, assistant sales manager, American Smelting and Refining Co. Addressing the National Western Mining Conference at Denver, sponsored by the Colorado Mining Association, he said that the traditional use of silver in the arts would become progressively less important to producers, due to increasing consumption in both new and established applications. Industrial uses now accounted for more than half of the estimated 250,500,000 troy oz. of silver consumed in the Free World in 1958.

The largest and most important industrial use of the metal is still in the photographic field. In the U.S. consumption for photographic purposes is placed at 28,000,000-32,000,000 oz. annually, while a similar quantity is used in the rest of the Free World.

The second largest industrial use is in the production of silver solders, for which purpose the U.S. consumes a total of 20,000,000 to 24,000,000 oz. annually. Some of the more important established applications for silver solders are in the refrigeration, air conditioning, automotive and electrical appliance fields. Among the newer uses are specialized high temperature applications (in heat exchangers, turbine blades, etc.) for rockets and jet aircraft, which call for a bonding material capable of producing a joint that is not only corrosion resistant, but also resistant to severe shock and vibration.

The third most important industrial outlet, and one which is rapidly growing, is in the electrical industry for all forms of electrical contacts where low contact resistance is important. An estimated 18,000,000 to 20,000,000 oz. is used annually in the U.S. for this purpose. The outlook for continued expansion in the consumption of silver for electrical contacts, both in the U.S. and elsewhere, is regarded as excellent. In this connection Mr. Wilcox pointed out that further expansion in the output of various electrical appliances and labour-saving devices would demand more and more silver contacts, while the rapidly growing electronics industry was also beginning to make greater use of silver for contact surfaces.

The ceramic industry uses silver in the form of silver carbonate or silver chloride for toning pinks in preparing overglaze colours and to produce a yellow-tinted pigment. It currently accounts for about 1,000,000-1,300,000 oz. of silver annually in the U.S. alone.

There is also a growing use of silver in the manufacture of primary and secondary silver-zinc batteries. The silver-zinc cell is ideally suited for jet aircraft and helicopter storage batteries, portable television, cameras and guided missiles. The silver-cadmium battery, which is rechargeable, is being increasingly used in portable equipment where rugged long life is more important than minimum weight. Total use of silver in the battery field amounts in the U.S. to about 1,500,000 oz. annually.

Miscellaneous uses include plating of fine copper wire; for desalting sea or other brackish water; dental alloys; backing for mirrors; pharmaceutical industry; medical and scientific equipment, and other applications.

On the subject of production, Mr. Wilcox pointed out that today very little silver was the primary objective of mining, this metal now being recovered for the most part as a by-product of mining for copper, lead and zinc. Hence the outlook for increased silver output depended not only on the price of silver, but also on the prices of copper, lead and zinc. Since it is the overall revenue per ton of ore that determines whether a particular deposit can be mined, a fair price and a good market for silver encourages the production of the associated metals, and vice versa.

Barring any tremendous expansion in the production of copper, lead and zinc, and in the absence of any drastic drop in the price of silver, world output of newly-mined silver is expected to continue over the next few years at approximately the levels of the past few years.

SOME HELP FOR COAL

The British Minister of Power, Lord Mills, has announced that the government has decided to postpone the conversion from coal to oil of two large power stations. Together with the re-negotiating of fuel contracts by other power stations, this postponement will provide a market for an additional 3,000,000 tons of coal in 1959. The Minister, however, restated that the government's policy is that the private customer should be left a free choice as to the type of fuel used in industry. There has been pressure from some quarters that oil imports should be curbed—particularly from the miners' unions—and this statement from the Minister has been welcomed by industry in general.

Over the past two years industrial and domestic oil consumption has increased from an annual 19,000,000 tons coal equivalent to 28,300,000 tons in those fields of application where a choice of fuel is possible. If one includes oil fuel for vehicles, etc., the total oil importation per year is currently running at some 28,000,000 tons—equivalent to approximately 55,000,000 tons of coal.

If British coal is to retain even its present share of the internal fuel market, the N.C.B. will have to increase the competitive ability of the industry. There are signs that this is precisely what is contemplated.

BRITAIN'S MINING MACHINERY EXPORTS—IV.

Co-operative Effort the Key to Overseas Markets

IN the last article of this short series, we turn from a broader consideration of the changing pattern of exports to an examination of what export selling really involves for the individual British mining machinery manufacturer, and more particularly for those manufacturers for whom exports have not hitherto been the primary consideration.

These latter are in a substantial majority, in that it is the exception to find a manufacturer with as much as 50 per cent of his mining machinery sales overseas, while for very many of the manufacturers in this industry, exports fall typically within the 5 to 25 per cent range. Moreover, the distribution of these sales is usually extremely spotty, with the bulk of the exports going to a quite small number of countries with which the manufacturer happens to have built up a connection. Consequently, it is at present the exception to find a British mining machinery manufacturer with a world-wide export organization, although, as we pointed out in the previous article in this series (*Mining Journal*, January 2), there are some signs that this position may change with the closer co-ordination of export sales effort as between firms in various Western countries.

It follows that what may be an unexplored market for one British manufacturer may already be an established market for another. If, therefore, in this concluding article it may appear to some of Britain's more experienced mining machinery exporters that we are unduly labouring the elementary facts of life in the export world, they may reflect that this may in itself be some measure of the degree of acclimatization which other manufacturers, to whom exports have only recently become all-important, have yet to go through.

Export Selling is Far More Complex

The fundamental difference between selling to the British mining industry and developing export markets is in the manufacturer's distance from his markets and in the high degree of product and market diversification called for in export selling. Whereas selling to the home market has meant selling to one customer owning a thousand coal mines, selling overseas can (disregarding the numerous small mines), quite typically, mean selling successfully to a hundred customers owning an average of five mines each and spread over twenty countries out of a total market of maybe 2,000 customers in a hundred countries operating in all more than 10,000 mines of all kinds.

These figures are intended to give no more than a rough indication of the size of the market; and in any case they will vary according to the product to be sold and according to the extent to which it is thought worth while to take into account small mines at great distances. They do, however, help to explain the relatively much higher sales promotion, selling, shipping, and servicing costs which have to be spread over orders for what, by home market standards, are likely in any one country to be small quantities.

The fact is that export selling is complicated not merely by the distances involved in communication and the much greater number of mine owners and types of mine with which it is necessary to keep in touch, but still more by great variation of political, economic, and technical circumstances which together contrive to make practically every country a market on its own.

In each market, account must be taken of the current climate of politico-economic relations between the country constituting the market and Britain as compared with other countries in a position to supply a competitive product. The following are typical of the queries arising under this head:

(*a*) Is the market in an economically advanced country? If so, import restrictions by tariff or quota may be more or less favourable to Britain than to her competitors, and local wage rates may or may not favour import as against local manufacture under licence or through a subsidiary.

(*b*) Is the market in a colonial territory or in an underdeveloped country which has only recently achieved political independence? If so, capital goods are probably being purchased through one or more of the numerous national and international aid programmes. In this event, just where has the finance originated and is it being made available with or without strings as to the spending of it?

(*c*) Have any foreign competitors an apparently unbreakable hold on the market, either through long association or through being able to quote unbeatable prices or credit terms, perhaps with the support of their governments?

(*d*) Does the qualified technical personnel employed in the industry show particular bias towards the mining methods or plant and machinery of a major exporting country. Do the bulk of the personnel happen to have trained in one of these countries, or are consultants from that country strongly entrenched in local mining?

A Few of the Technical Problems

On technical grounds, the following are typical factors which may favour, or be against, the British manufacturer in relation to his foreign competitors:

(*a*) Are the mining methods such as to be intrinsically suitable for the use of the manufacturer's existing standard products? (E.g. coal cutters and loading systems designed for long-wall methods will not sell where short-wall methods are the usual practice.)

(*b*) Are safety standards such as to give Buxton approved equipment automatic acceptance, or would equipment made to this standard either not conform to local requirements, or be of too high a standard and therefore be too expensive or too complicated to operate with inexperienced labour?

(*c*) What is likely to be the degree of mechanization in the industry over the next few years? Does the country have a severe labour shortage making mechanization all-important even with unskilled men, or is there a large low-cost labour force available?

The foregoing is obviously not intended as an exhaustive list, but merely to be indicative of the kind of problems which have to be considered afresh in each country to which a manufacturer turns his attention. It does not, of course, follow that the answers will be unfavourable to the British manufacturer, and indeed he will often start with considerable advantages. It is, however, such con-

siderations as these which will determine whether it is worth the manufacturer's while to make an intensive and sustained effort in a particular market.

High Cost in Money and Men of Export Selling

With so many possible variables in the situation in each country, it follows that a detailed survey of the political and economic situation no less than the technical factor is an essential preliminary to entering a new market. The British manufacturer, who is turning seriously to exports, must rid himself of any thought of seeking merely to sell in other markets products which are already going through his factory to his established customers. If he is in the export market, it must be to sell highly specialized know-how and adaptable design and manufacturing facilities which together can produce an engineering product to suit any set of mining conditions. The problem is how to make these services available competitively in a variety of different and often quite small mining markets.

Thus it follows that those British manufacturers, for whom the scale and structure of their sales organizations have hitherto been largely determined by the circumstances of the home market, will in their approach to exports find it necessary to develop an entirely fresh concept of what are the "normal" market research, design, development, and sales cost elements in a profitable selling price.

Moreover, for such firms it is not simply a matter of cost. It is equally a matter of personnel. There are, for example, in Germany something like fifty quite independently owned and managed groups of collieries, while in the United States diversification of ownership goes much further when account is taken of the metal mining industry as well. It is, therefore, not surprising that the mining machinery manufacturer in both these countries has been compelled to develop a dynamic and flexible approach to product development and selling in his own highly competitive domestic market, and in the process has built up a substantial technical sales force. This has often given the managements of German and American firms an initial advantage both in outlook and in reserves of experienced personnel when confronted, as they have been in recent years, with the need to expand export sales as an insurance against declining mine output at home.

The necessity for each individual manufacturer to provide a permanent sales and servicing organization in a particular country applies, of course, more particularly to consumable goods and to capital goods of a semi-consumable character, as distinct from long-life capital goods (such as winding installations and plant and machinery for reduction mills, coal washeries, and smelters), which lend themselves particularly to selling of the prime contracting type. With modern air travel, selling and after-sales service for the latter can often be effected by home-based engineers with permanent local representation limited to the need for market intelligence and for maintaining friendly relations with the principal mining operators and with government.

The Special Problem of the Small Firm

There are, of course, the few British manufacturers who have long been selling with success to the mining industry around the world. Numerically they are, however, greatly in the minority and, if the picture which we have drawn can be accepted as a fair general assessment, it follows that the problem of the smaller manufacturer, who lacks the resources to tackle all promising export mining markets simultaneously, poses a special problem on a sufficiently wide scale to deserve attention.

On the one hand, the changes in the domestic mining market, which we have considered in an earlier article, impose on the small manufacturer, no less than the big, the necessity of developing other sales outlets, yet at the same time the extremely high cost of becoming established in new export markets may well be prohibitive in relation to the turnover of a small factory. Basically, therefore, the problem is how to reduce this high cost for the small manufacturer both in terms of money and personnel.

Leaving aside any possibilities of integration in the industry through amalgamations, takeovers, etc., which raise issues beyond the scope of these articles, we believe that individual manufacturers can go a long way towards easing their problems in these new markets by co-operative effort for clearly defined and sometimes quite limited objectives.

An extreme example of a limited objective might be the formation of a consortium of manufacturers under the leadership of a prime contractor working in close liaison with the mine owner's consultant (British, let it be hoped!) for the initial opening up and equipping of one particular mine or group of mines and perhaps subsequently for servicing and replacement sales. (See article in *M.J.*, Jan. 2.)

The Scope for Local Sales Co-ops

A more permanent association might arise through a group of manufacturers, who sell related but not directly competing products, combining to establish a joint market research and selling co-operative in one or more specified territories. By thus limiting the geographical area of co-operation, a manufacturer who might already have satisfactory selling arrangements in, say, South Africa could still benefit from participating in a co-operative sales group in Canada or in some of the Latin American countries.

In some respects there would be little difference between a co-operative and several non-competing manufacturers using the same local agent. The disadvantages of the agency system are, however, often considerable, and a co-operative organization, employing local personnel alongside British engineers, would at least ensure each manufacturer of a direct participation in the management of the local organization and would also cut out the substantial middleman's profit.

Successful co-operation must, of course, grow gradually with mutual confidence and cannot be precisely blueprinted from the start. Thus, where a group of manufacturers are initially tackling a market which is new to them, the co-operation might in the first instance be simply for the initial market survey. Thereafter some of the group might elect to drop out and the remainder to push ahead, perhaps with new members added, for an initial period of only a few years.

A number of manufacturers, who are attracted to the idea of the co-operative in theory, are hesitant to put these ideas into practice for fear that some of their associates in such a group would not or could not pull their weight. This is understandable enough in an industry where some of the smaller units have hitherto had little export experience. Nevertheless, somebody has to take a lead, and inevitably it is the firm which already has a working knowledge both of the mechanics and the psychology of export selling which must provide the catalyst for the co-operative group. Moreover, there is no reason why the arrangement should not be attractive even to the member of the group which is contributing the most. Provided that it stands to gain some advantage, if only through the sharing of survey or selling costs, it certainly stands to lose nothing, always assuming that the members of the group are selling non-competing products.

Another problem of which any co-operative project would need to take account is that some categories of mining product carry intrinsically higher selling costs than others. Again the initial experimental work involved in getting acceptance for the use of, say, hydraulic pit props in a market not previously used to them could mean that a very unequal amount of sales effort might have to go into the marketing and selling of various products handled by the co-op. It should, however, be possible to resolve these kinds of difficulties, irrespective of the price for which a product sells, by means of a variable sales discount payable by each manufacturer to the co-op based on the cost of handling the product. This would ensure that for the co-op's sales engineers the incentive to sell was equally strong on all products handled.

The Need for an Export Promotion Association

If co-operation can be said to be the key to solving some of the small manufacturers' problems, it is no less true that great scope exists for closer co-operation on export matters in the industry as a whole, without in any way impairing the competitive initiative of individual firms. Such co-operation could perhaps best be developed through the establishment of a really dynamic mining machinery export promotion association. We have already had occasion to point out in this series that there is at present no such association able to act for the British mining machinery industry as a whole, and it may be useful if we conclude this series of articles by considering some of the functions which such an association might usefully perform.

In the first place, the cost of conducting the initial surveys of new markets, and subsequently of obtaining market intelligence about new opportunities in these markets, could be greatly eased for the individual manufacturer by such an association. Not only is much of this information just not at present available in Britain, outside perhaps of the intelligence departments of a few of the big and internationally established engineering groups, but often, for the reasons explained in our first article on the state of British mining consultancy, information becomes available too late for the manufacturer to tender. Quite apart from the dreadful duplication of effort involved, it is obviously quite impossible for the majority of firms in the industry to spare the money or the personnel for compiling and maintaining such intelligence from *all* overseas markets, but if such services were centralized in an export association, a comprehensive job could be done relatively cheaply.

How Big Will the Export Market Become?

On a yet broader front, it is extremely doubtful whether any manufacturer in Britain has successfully attempted the task of assessing the probable size of the overseas mining machinery market during, say, the next ten to fifteen years and of translating this into terms of the likely demand for various types of product and for various areas of the world. Yet the long-term potential of a new market must be the manufacturer's prime consideration in deciding whether to cultivate it.

Because the mining industry is momentarily in a period of recession, this should not be allowed to obscure the tremendous long-term expansion which must take place in mineral production. Sir Ronald Prain, chairman of the Rhodesian Selection Trust group of copper companies, forecast recently that the copper industry would require new capital investment of the order of £1,000,000,000 between now and 1970 to keep pace with expanding demand for this metal. Again, the aluminium industry is known to be making plans for a further tremendous expansion in production during the next fifteen years, which might double existing capacity despite the surplus which exists at the moment. Moreover, the capital investment required per ton of aluminium produced per annum is substantially higher than it is for copper. Again, the recently published seven-year plan for Russia points to a vast increase in practically every kind of mineral production.

Estimates of this kind have not just been dreamt up, even though any long-term projection of requirements must contain a margin of error. Moreover, this is the kind of data upon which the big mining groups of the world must base their forward plans, as there can be a time-lag of ten years and more between the first discovery of a new mineralized area and the bringing of the mines into full production.

It would thus surely be one of the functions of a manufacturers' export association to collect and digest this data and to express it in terms of potential world demand for mining machinery.

Liaison With Governments and Financial Institutions

In previous articles in this series we have already demonstrated the considerable handicap under which British manufacturers operate abroad through inadequate liaison with the five or six British Government departments concerned with exports. This applies especially to the obtaining of earlier information regarding the financing of new surveys and new mining projects, and also to the need for ensuring that British consultancy know-how and manufacturing facilities are made available to the country receiving financial aid at the outset of the financial negotiations. Getting Whitehall to reconsider its position in these matters is something which can *only* be brought about by the mining machinery industry acting in concert and the establishment of an export association seems to us to be desirable on these grounds alone.

Again, a number of trade practices, followed with government assistance in countries which are Britain's main competitors, place the British mining machinery manufacturer at a considerable disadvantage. Typical of these are uneconomic and/or uninsurable terms of credit, tax-relief incentives and other subsidies on exports, highly developed barter trading, and financial aid with strings. How to combat competition of this nature can only be discussed with Whitehall by some organization in a position to speak for the industry as a whole.

Beyond this, such an association would be better able than individual members to maintain continuing contact alike with consultants and others engaged on mineral search, with all likely sources of finance (inside and outside the Commonwealth) both for the initiation of new exploration and for actual mining projects, and with the foreign governments and private interests likely to become the principals in such projects through their ownership of mineral rights.

Finally, aside from market intelligence and government liaison, an export association could provide the focal point for a considerable amount of collective sales promotion and for helping members to band together for specific and limited market objectives.

In short, there is scope for a tremendous economy in market research and sales promotion effort through an export promotion association, while there are other matters involving negotiations with Whitehall and with governments and international agencies overseas which cannot effectively be handled at all except through a united front. It would cost quite a lot of money to run such an export association, but certainly no more than is spent at present through the piecemeal and duplicated efforts of individual manufacturers, while the benefits from a co-ordinated joint effort could be out of all proportion greater.

Malaya and the I.T.A

THE International Tin Council, charged with the administration of the International Tin Agreement, is composed of six tin producing and fourteen consuming countries. Decisions are by majorities of both the producing and consuming countries.

The object of the Agreement is to achieve a stabilized world price for tin metal at such a figure that it will be economic to produce, and thus ensure continued supplies in the future.

In this article will be shown how the Federation of Malaya has fared as the result of its obligations as a producer member of the International Tin Council.

Contributions to Buffer Stock Pool

The first action taken to raise the world price of tin was the setting up of a buffer stock pool for the purpose of removing surplus supplies from the market. The funds for this purpose were provided by the producer countries in the proportions of their respective allocations.

The first call was for 15,000 tons of tin metal, or the cash equivalent, at the then basic price of £640 a ton. All the producers agreed to pay in cash. The Federation of Malaya paid over its 37.50 per cent on October 10, 1956. The Federation's Government borrowed the money from the banks and as from October 15 a contribution, at the rate of $M24 on every picul of tin concentrates exported, was collected from the producers. In this way the full loan and interest, amounting to $M30,771,000, was repaid by October 14, 1957.

The second and third contributions to the buffer stock pool, each of the equivalent of 5,000 tons of tin metal at the increased basic price of £730 a ton, were called up and paid during December, 1957. The Federation again financed its contribution by borrowing from the banks. Collections from the producers to repay the amount borrowed for the second contribution and interest, commenced on January 1, 1958, at the rate of $M12 a picul of tin concentrates, increased to $M21 from March 1. The producers contributed in this way $M12,603,433 to clear the second contribution loan by November 30.

Collections for the third contribution started on December 1 and at December 31, 1958, there was outstanding on this account $M11,947,863. It is estimated that, allowing for interest and assuming a continuance of contributions at the current rate, the whole amount will be cleared early in October, 1959, when the Federation's share in the tin held in the buffer stock will belong to the members of the industry in proportions according to the contributions certificates issued to them. By that time the tin producers in Malaya will have something like $M56,000,000 cash tied up in the buffer stock pool.

Control of Exports

The second expedient to right the imbalance between supplies and demand, the control of exports, was introduced on December 15, 1957.

The Federation had prepared for this event. The average production for the five preceding years of the European-managed mines, the Asian mines and the dulang washers had been ascertained, and to each section was allocated a percentage ratio upon which export quotas would be allotted. These were: European mines 58.66 per cent, Asian mines 39.55 per cent and dulang washers 1.79 per cent. Each producing mine was given an assessment based on its average production and on this the quota for that mine would be based.

The first restriction on exports imposed by the International Tin Council permitted a total of 27,000 tons to be exported by the six producing members in the period December 15, 1957, to March 14, 1958, later extended to March 31. The Federation's 37.50 per cent share was 10,125 tons and the allocations to producing units, on percentages of assessments, were, to European mines 60.38 and to Asian mines 59.37.

The total permissible export amount for the second quota period was 23,000 tons, of which the Federation of Malaya received an allotment of 8,625 tons. The effect was to reduce the quota percentages to 48.02 per cent for European mines, and to 45.78 for Asian mines. These percentages for the third quota period, in which the permissible export amount continued unchanged, were 48.50 per cent and 45.49 per cent respectively.

For the period October 1 to December 31, 1958, the International Tin Council further reduced the total permissible export amount for its producer members to 20,000 tons, of which the Federation received an allotment of 7,500 tons. The quota percentages for this period were European mines 43.50 per cent, and Asian mines 41.07 per cent.

In allotting quota percentages, adjustments were made for overfill in preceding periods and a small reserve retained for contingencies.

Producing units are permitted to pool their quotas within groups, thus obviating the wasteful necessity of all units within a group having to continue in production at less than 50 per cent of their capacity. However, in order to obtain a quota allotment a unit not actually producing must be maintained in such a condition that it can be brought back into production at reasonably short notice and it must have unworked reserves.

The International Tin Agreement permits the accumulation of mine stocks of concentrates up to one-fourth of pre-control production, which in practice means one-fourth of the annual assessment.

Exports from the Federation for the purposes of the Agreement are in the form of tin concentrates. All concentrates pass through custom control points on their way to the smelters, and it is at these points that export takes place and export duty is assessed. The smelters in Malaya also receive concentrates from Thailand, Burma and other countries, thus tin metal exports cannot be related to the production of the mines in the Federation.

Production Statistics

Production of tin concentrates in 1958 was 859,178 piculs (1 picul=133⅓ lb.) compared with 1,322,869 piculs in 1957. Exports, or deliveries to smelters, were 737,666 piculs and 1,322,869 piculs respectively. The tin metal content of exports was 33,176 l.tons in 1958, against 59,655 tons in 1957.

The Federal revenue received $M29,632,513 in Export Duty on tin in 1958. The Duty realized $M54,491,839 in the previous year.

The average price of tin metal on the Singapore market

for 1958 was $M369.35 a picul, for 1957 the average was $M373.19.

The active tin producing units at the end of 1958, with the 1957 figures for comparison, were :

	1958	*1957*
Dredge	34	76
Gravel Pump	333	597
Hydraulic	9	10
Opencast	1	4
Underground	19	25
Other	21	26
All Units	417	738

The directly employed labour on tin mines had fallen from 36,585 in December, 1957, to 23,153 at the end of 1958. This latter figure includes many who are not in full employment, since the mines are retaining as many of their labour forces as they can, working them for an average of not less than four days in seven in rotation.

Retrenched workers have, generally, received gratuities or, in the case of older men with long service, pensions. In many instances, too, they are permitted to continue to live in the mine quarters free of rent and with free electricity, water and other amenities. Allocations of plots of land on which they can grow vegetables and other produce for the use of themselves and their families or for sale, have been made by mine managements, with, in many cases, assistance in the preparation and planting of the plots. Consequently, the year 1958 was remarkably free from any labour trouble or unrest in the tin industry.

Wide Impact of Tin Control

The full impact of tin control on the Federation's economic position is, however, not restricted to the direct effect on the mines. It has been estimated that for every employee in the mines there are at least four other employees dependent thereon; in the ancillary industries such as engineering, foundries, power supply and shops. It has already been shown that the direct Federal revenue from Export Duty on tin has been almost halved and some $M56,000,000 has been tied up in the buffer stock pool. There is also the retarding effect on the economy of the country in the loss of some $M180,000,000 in the reduced value of exports, largely to hard currency countries, and the inevitable fall in income tax receipts. The industry is also suffering the immobilization of several millions of dollars in inactive plant and equipment and mine stocks.

In spite of all the hardships suffered, the obligations accepted have been faithfully fulfilled, as is shown by the following table of the Permissible Export amounts allotted to the Federation by the International Tin Council in the first four quota periods and the actual exports.

	Permissible Export Amount (l.tons)	*Exports (l.tons)*
First Control Period :		
Dec. 1, 1957, to March 31, 1958	10,125	10,704
Second Control Period :		
April 1 to June 30, 1958 ...	8,625	7,999
Third Control Period :		
July 1 to Sept. 30, 1958 ...	8,625	8,555
Fourth Control Period :		
Oct. 1 to Dec. 31, 1958	7,500	7,608
	34,875	34,866
	34,866	
Underfill	9	

Mine stocks, the accumulation of which has helped in the retention of workers in employment, totalled 159,590 piculs of tin concentrates at the end of 1958. At an assumed assay value of 75.2 per cent these stocks represent approximately 7,040 tons of tin-in-concentrates.

The Cuyuna Manganese Deposits

THE Cuyuna iron range in Crow Wing County, Minn,, is the principal producer of manganiferous iron ore in the U.S. The ore is mined from a manganiferous iron formation in the bedrock of the Cuyuna district. This iron formation is divided into two general lithologic types—thin-bedded and thick-bedded. The unoxidized, thin-bedded iron formation is composed of iron silicate with associated fine-grained carbonates of iron and manganese. The thick-bedded iron formation carries iron and manganese oxides with intimately associated silica. Oxidation and leaching of the original iron formation have been the most influential factors in producing manganiferous iron-ore concentrations in quantities large enough to exploit on a commercial basis.

The Bureau of Mines has estimated that the North (or Main) range and the outlying area of the Cuyuna district contain 432,000,000 l. tons (indicated and inferred) of different classes of manganiferous iron-bearing formation suitable for making ferrograde manganese ore by mineral-dressing methods and subsequent leaching processes. The rocks range from 1 to 10 per cent in manganese content.

History

World War I hastened the development of the Cuyuna by cutting off supplies of imported manganese almost completely and so creating a demand for manganiferous ores. No other mining district in the U.S. had such potentialities for these ores as the Cuyuna.

Utilization of the high-silica manganiferous black ores during World War I probably established their use for everyday furnace practice in the U.S. Apparently this led to the acceptance of the brown ores, with low silica and higher iron content, which have been used since about 1922.

World War II had a similar effect on the Cuyuna as the previous war, but on this occasion the accent was on the

As part of its research programme for the recovery of manganese from low-grade domestic ores, the Bureau of Mines, U.S. Department of the Interior, has been carrying out studies on the beneficiation of various Cuyuna range materials. These materials represent one of the larger domestic manganese resources. A progress report entitled " Investigation of Cuyuna Iron-Range Manganese Deposits, Crow Wing County, Minn.," has been published as Report of Investigations 5400. The authors are Walter E. Lewis, Leonard F. Heising, James W. Pennington, and Charles Prasky. The report is obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. [price 40 cents].

production of the low-silica brown ores. The demand for these ores has not slackened and doubtless will continue. Early in World War II one company attempted again to utilize the high-silica black ores.

Investigations were conducted by the Defence Plant Corporation, a Federal Agency, in 1941-42 for sources of manganiferous material suitable for treatment in a plant which was to be operated by Anaconda. Plans called for treatment of crude ore, ranging from 7 to 10 per cent manganese, to give a final product containing 50 per cent or more manganese. Several factors caused the plans for construction of the plant to be postponed, however, among them being a lessening in the enemy-submarine menace and the absence of any proved metallurgical method of treating the material.

Five companies on the Cuyuna are currently active in mining iron and manganiferous iron ore—Pickands Mather & Co., The M.A. Hanna Co., Inland Steel Co., Rhude & Fryberger, and Zontelli Bros., Inc. These companies own or lease land from which ore is being removed. The larger companies are currently holding and have held for many years several of the highly siliceous black-ore areas, since the ore might eventually be used again, as in World War I, as a manganiferous iron ore.

Beneficiation Plants

Beneficiation has played an important part in the history of the Cuyuna range. The usual methods are : Crushing, screening, washing, jigging, drying, sintering, and high density. Of the seven methods listed, only washing, jigging and high density are actually employed to remove objectionable gangue minerals—usually silica. Crushing and screening benefit the physical structure of the iron ores, sintering improves the structure (if the ore is fine) and removes combined water, while drying removes excess moisture but does not remove objectionable solid impurities.

In 1953 nine physical-ore-dressing plants were operating on the range; in addition, one plant has been operated intermittently since December, 1954, as a semi-commercial pilot plant producing manganese carbonate by a chemical-leaching process. This is the Manganese Chemicals Corp. plant at Riverton, Minn. High-grade manganese carbonate is produced from manganiferous oxide material in this plant, which employs the ammonium carbonate process. The carbonate has in part been pelletized to a minimum of 60 per cent manganese.

The Bureau of Mines recognizes that the current production of manganiferous iron ore from the Cuyuna is necessary in producing basic blast-furnace pig iron and should not be disturbed. The Bureau's greatest interest is accordingly centred on the manganiferous iron formation that is not now merchantable as a manganiferous iron ore.

The main research effort has been directed towards classifying the different types of manganiferous material in the iron formation, so that comparable mineral-dressing and chemical tests can be made on the respective classes. Even if a given class cannot be used as a raw product for the production of ferrograde manganese ore, the studies made of it through mechanical beneficiation, flotation and other processes will aid immeasurably in determining its future use as a manganiferous iron ore. Thus current research by the Bureau can be applied in two different ways : (1) By determining the usefulness of the material for producing ferrograde manganese ore ; or (2) by determining its usefulness for producing an acceptable manganiferous iron ore.

The amenability of the following classes of manganiferous iron-bearing rocks to concentration by physical methods was studied : (1) The unoxidized, thin-bedded iron formation ; and (2) the oxidized, thin- and thick-bedded iron formation. None of these classes represents merchantable-grade manganiferous iron ore, and none can be concentrated by simple washing methods.

Mineral-dressing studies show that the valuable manganese and iron minerals can be separated from the complex silicates and free silica. Although some separation was possible at sizes coarser than 100-mesh, grinding to minus-200-mesh was necessary to produce acceptable products.

A concentrate of the unoxidized, thin-bedded iron formation, assaying as low as 6.7 per cent silica with a calculated manganese recovery of 85 per cent, was produced in laboratory flotation tests. The iron recoveries were lower (amounting to only 67 per cent) because of losses in the iron silicate gangue minerals. After this concentrate had been calcined at 1,000 deg. C., it assayed 41.1 per cent iron, 16.0 per cent manganese, and 9.5 per cent silica.

Concentration of the manganese and iron in oxidized, thin- and thick-bedded iron formation has not been accomplished to any comparable degree.

Laboratory flotation studies are being continued by the Bureau of Mines on all classes to reduce reagent costs and to improve product recoveries. Pilot-mill tests are planned to determine consumption of reagents and other engineering data under continuous operating conditions.

Sulphatizing Process

The unoxidized, thin-bedded iron formation has been studied by the Bureau of Mines on a pilot-plant scale, using a high-temperature sulphatizing process for recovering a ferrograde manganese product. There are three steps in this process. The crushed rock is roasted in an atmosphere of sulphur dioxide gas and air to convert the manganese to a soluble sulphate. The temperature range for the conversion of the manganese is between 600 deg. and 850 deg. C. Iron sulphate is not formed at these high temperatures.

The manganese sulphate in the sulphatized product is dissolved in water. Iron, phosphorus and calcium sulphate remain in the leach residue as water-insoluble products.

Water is evaporated from the leach solution and manganese sulphate monohydrate crystals are recovered. The crystals are formed into sulphate pellets and decomposed by heating to a temperature of 1,300 deg. C. The resulting product is Mn_3O_4.

A shaft furnace was found to be suitable for converting the manganese carbonate to a water-soluble sulphate. The conversion of manganese to sulphate in the shaft improved as minor changes in design were made and experience was gained in furnace operation. Additional studies for the conversion of manganese to a sulphate will be made in a fluosolids-type reactor.

Any conventional vacuum filter should be adequate for separating manganese sulphate monohydrate crystals provided it is resistant to solutions having a *p*H of 1.0.

Although individual steps in the unitized study of this process have been carried out successfully, further investigation will be required to devlop data applicable to a continuous process. Additional studies will also be necessary on the oxidized thin- and thick-bedded iron formation.

It is possible that in a continuous process a manganese oxide product averaging 60 per cent manganese could be obtained. A blend of all classes of materials available may be suitable as a raw-material feed to the plant. Higher grade manganese oxide products would be obtained from the process if the raw materials were upgraded by flotation methods before chemical processing.

Machinery and Equipment

A Range of Industrial Diesels

On Wednesday of last week members of the Technical Press inspected research engines of the Ruston and Hornsby AT range of diesel engines. The engines are not yet in production, but the industrial type can be envisaged as being suited to application at mining properties, possibly with particular reference to those at more isolated sites.

The AT range is directed by the manufacturers as a competitive force to the like products of European makers in the South American and other world markets. Sales will be completed through the normal Ruston and Hornsby channels.

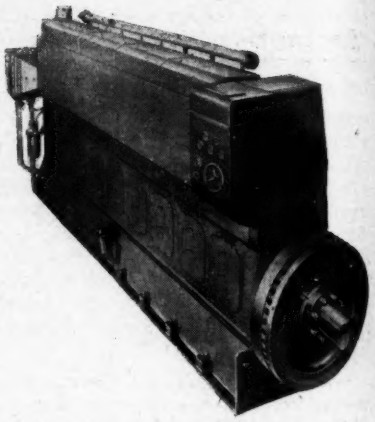
In the initial development work on the AT range, the engines have been run at b.m.e.p.'s up to 180 lb./sq. in., and most of the testing so far has taken place at up to 160 lb./sq. in. b.m.e.p. With the four-valve cylinder head and efficient air and exhaust ducting which are fitted as standard, good fuel consumptions were obtained at an early stage. On both the six- and eight-cylinder prototype engines, intercooled fuel consumptions of 0.339 lb./b.h.p.-h. have consistently been obtained from 130-160 lb./sq. in. b.m.e.p.

Meanwhile, development is being pushed ahead to the higher ratings for which the engine has been designed, and in this work the trends indicated by the computer results are being fully investigated. The engine has been designed with a view to the combustion of a variety of liquid fuels, and no changes are necessary in the basic components for the combustion of heavy fuels. A programme is also in hand for the development of the combustion system of the engine for gaseous fuels. Many major design advances have been incorporated in the AT series.

From the model tests, knowledge of the loadings and consequent deflections in oil engine main bearings has been greatly increased, and this has enabled the manufacturers to evolve an optimized design for the AT series. The type of support used for the main bearings represents an entirely different approach from previous British practice. It may be of interest to record that the deflections of the final design of main bearing, measured on actual engine castings under simulated firing loads, were reduced in the ratio of 5 : 1 as a result of the development of the design.

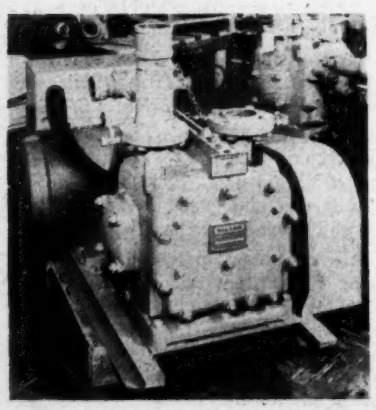
One of the lessons learned in applying the existing range of Ruston medium-speed engines to the varied types of application for which they have been in demand, has been the need for versatility in both the basic design of the engine, and in its auxiliary equipment. In the AT engine, the highest degree of versatility has been achieved by the introduction of many special design features. Indeed, the full power of the engine can be taken from either end of the crankshaft, which has identical flanges at each end. This feature, coupled with the great inherent torsional stiffness of the crankshaft, considerably increases the number of applications which can satisfactorily be met by the standard engine without the need for introducing extra equipment. "Reverse rotation" engines are available, and auxiliary drives can be taken from five separate positions on the engine.

The manufacturers claim that the AT series of engines represents a significant advance in diesel engine practice. One reason for this is that sufficient time has been allowed for intensive development of the design both from the theoretical and practical points of view.



Industrial version of the AT diesel range

Megator sliding shoe pumps awaiting shipment to U.S. coalfields, shown in the assembly shop of the U.S. subsidiary of Megator Pumps and Compressors Ltd. The mining pumps, which have been specially adapted to American requirements, have been awarded a certificate of "permissibility" from the U.S. Bureau of Mines, the equivalent of a Buxton certificate in this country



CLEATS INCREASE BELT TONNAGE

Rubber cleats can be applied to rubber conveyor belting in the field without heat or cumbersome equipment. The cleats can be placed at 90 deg. (crosswise on the belt) in the form of chevrons or V's, along the sides of the belt to act as guide rails, or in any pattern desired. They are fixed to the belt by a self-vulcanizing process.

The application procedure involves preparing the belt surface to receive the cleat, brushing a thin coat of vulcanizing fluid over it, placing a strip of rubber sheet the same width and length as the cleat over this area, vulcanizing strip and cleat, and finally, placing the cleat over the prepared area. The belt can be used immediately.

It is claimed that these REMA cleats, manufactured in Western Germany, increase belt life and efficiency, especially when used as a replacement for metal cleats.

Rubber cleats help in upgrading the tonnage performance of conveyor belts hauling many types of materials. The thing that stands out most is the ease with which they can be applied to a belt in the field, a feature that makes them a valuable addition to any belt maintenance kit.

NEW WALKING DRAGLINE

Erection of a £396,000 walking dragline is in progress at the Yarborough ironstone quarry, Scunthorpe, of the ore mining branch of The United Steel Companies Ltd. The 790-ton machine, known as a W600, is expected to begin work in June. It has an 186-ft. long jib and its 10 cu. yd. bucket will enable it to strip 15 tons of overburden at each "bite". Initially, the depth of overburden will be 30 ft., increasing as the quarry is exploited.

The W600 is the second machine of its kind in the Scunthorpe area. When the new dragline starts work, the Yarborough quarry will be able to provide between 36,000 to 40,000 tons of iron ore per week for the Appleby-Frodingham blast furnaces.

DOORLESS COAL MINE VENTILATION

Coal mine ventilating systems designed to control main air currents without using doors are best from the standpoint of efficiency, safety, and economy, according to a U.S. Bureau of Mines' report.

The report is based on studies of effective coal mine ventilating systems in which overcasts, undercasts, and regulators replace doors. It also tells how recent accidental shortcircuiting of ventilating currents by an open door caused an accumulation of gas and resulted in a mine explosion.

A copy of the report, Information Circular 7853, "Coal-Mine Ventilation Without Doors to Control Main Air Currents", can be obtained from the Publications-Distribution Section, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa. It should be identified by number and title.

Technical Briefs

A Cobalt-Platinum Magnetic Alloy

Johnson, Matthey and Co. Ltd. announce that they are now producing Platinax II, a cobalt-platinum magnetic alloy.

The outstanding magnetic properties of certain alloys in the cobalt - platinum system have been known to metallurgists for many years, but it is only in recent times that the properties of the alloy containing an equal number of atoms of each element (23.3 per cent by weight of cobalt) have been fully appreciated. Platinax II is the latest development in this field, and is one of the most powerful permanent-magnet materials.

After heat treatment by a special JMC process, Platinax II has remarkable physical and magnetic properties, a remanence of about 6,400 gauss, a coercive force of 4,800 oersteds, and a BH(max) of 9.2 x 10^6 gauss-oersteds being obtainable. Moreover, in the heat-treated state the alloy is magnetically isotropic, exhibiting similar magnetic properties in all planes.

Apart from the benefit of its exceptional magnetic properties, the use of Platinax II offers a further advantage in that the alloy is comparatively workable before heat treatment and can be machined, rolled, and drawn without difficulty, and so lends itself to the manufacture of magnets of complicated shape or extremely small size.

Further information on Platinax II is available on application to the company's head office at 73-83 Hatton Garden, E.C.1.

X-RAY SPECTROGRAPHY

A continuous process of X-ray spectrography has been developed by Philips Electronics for Cominco in order to monitor zinc flotation tailing. A gauze-covered vacuum drum will pick up material continuously. The solid will be removed, re-flexed and extruded as a 2 in. x ¼ in. ribbon for passage under the X-ray beam, so that the zinc content can be recorded.

It is claimed that there will be only a 60 sec. delay between the pump entering the filter and the delivery of the result, whilst similar equipment can be used for a number of other elements.

MAGNETIC INDUCTION IN ROCK BREAKING

A new method of rock breaking, using high-frequency magnetic induction, has been patented in the United States. It is stated that "energy of the order of 25 kW. at a frequency of about 4 to 7 megacycles per sec. will successfully fracture taconite". The energy can be applied by passing material through a coil or by passing a "pancake" coil close to the material.

As soon as the high-frequency current passes through the coil, the rock starts to crack and spalls. After a time areas become heated and may fuse, but treated ore crumbles readily. An asbestos conveyor system is suggested to apply the energy, after which a short fall from the end of the belt will cause the fragments to crumble.

CHEMICAL AND LABORATORY PUMPING

A new compact light-weight pumping unit is announced by Goodyear Pumps Ltd. It is specially designed for chemical processing applications and laboratory installations, although also suitable for general pumping duties.

To a Goodyear size A5 positive displacement pump is coupled a Newman Elf ¼ h.p. a.c. electric motor mounted on a special light-weight aluminium bedplate casting. The pump, with a normal operating speed of 1,440 r.p.m., delivers 5 gal. of water per min. It is completely self-priming and can run with a dry suction for long periods, making it ideal for emptying vats and barrels completely. This versatile pumping unit is also capable of handling viscous fluids and fluids which contain suspended solids.

The Goodyear A5 rubber-to-metal type pump has only two moving parts in contact with the liquid, the plate wheel, and rotor. The taper roller bearings are grease packed for long life, and high efficiency radial face shaft seals are fitted which do not cause the shaft to wear as they become due for renewal, as with a packed gland.

A special feature of the design is the cast light-alloy bedplate, curved over its central span for rigidity and ease of cleaning. It should be emphasized that this pump set is virtually silent when running on full load, and it can be commended for duties where quiet running is an important consideration.

The set with Meehanite pump weighs 46 lb., and the dimensions are 20½ in. long, 7¼ in. wide and 9½ in. high.

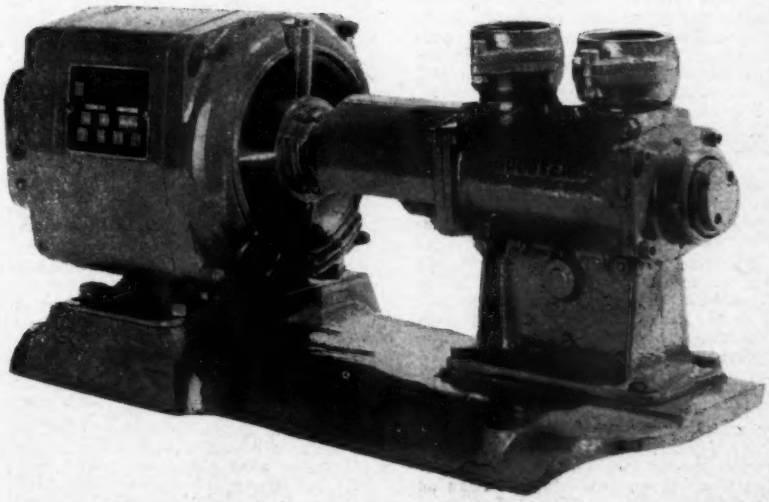
DSM SCREENS IN A HEAVY-MEDIA CYCLONE PLANT

In a heavy-media cyclone plant, it is usually necessary to clean large tonnages of media as the screens for separating the "float" and "sink" from the media cannot be operated at a very fine cut—say, about 65 mesh, owing to low capacity and high screen wear.

Recently, in the Holman-Cliffs concentrator at Taconite, a DSM screen having an 0.5 mm. opening has been tested which gave a separation between 65 and 100 mesh as draining surfaces prior to the washing stage in order to reduce the amount of media requiring cleaning.

Although tests are not complete as yet, it has been found that capacity is high, amounting to 35 or 40 l.tons per hr. per ft. at 70 per cent solids, whilst the screen life appeared to be upwards of 13,700 tons per sq. ft.

The new Goodyear process pumping set. A Goodyear A5 positive displacement pump and a ¼-h.p. Newman "Elf" electric motor mounted on a lightweight aluminium bedplate casing. Output of the set is 5 g.p.m.



Metals and Minerals

Platinum Gains Further Strength

Some ten days have elapsed since the firming up of the free platinum market and the growth of industrial demand led to the first increases in official platinum prices for about three years. As we pointed out last week, it was perhaps over-optimistic to predict a recovery on the basis of a single price increase, although the outlook seemed by no means discouraging.

The past week has witnessed a further sharp increase in platinum prices on the open market. On February 19, a price range of £22 10s. to £23 10s. per troy oz. was being suggested, compared with £20 15s. to £21 5s. on the previous day. For the first time in two or three years, free market prices were higher than the prices quoted by the two leading refiners. In these circumstances, a further increase in the official quotations came as no surprise. As from February 20, Johnson Matthey raised its price in the U.K. to £25 and its U.S. prices to $67 for large lots and $70 for small lots. Similar action was subsequently taken in the U.K. by Baker Platinum and in the U.S. by the Baker Platinum Division of Englehard Industries, in both cases with effect from February 24. Meanwhile, open market prices were still rising, and at the beginning of the current week business was being done above last Friday's closing price of £25 an oz., the highest price reported being £28 15s.

A good demand is still reported with free market prices currently around £27 and the running up of prices has induced some consumers to enter the market. However, the comparatively high prices ruling have brought out a certain amount of material, and it is understood that more platinum is now on offer. It has yet to be seen whether and when the Russians will decide to take advantage of the much higher prices now ruling. Doubtless the re-appearance of Russian offerings on a large scale could cause values to fall back quite sharply, having regard to the extent and rapidity of the rise. However, reports of delay in deliveries of Russian metal after purchase suggest the possibility that the U.S.S.R. may be short of supplies. If so, the possibility of further price increases in the short-term can certainly not be excluded. So far as industrial demand is concerned, this appears to be better than it has been for the last year, while the curtailment of output at Rustenburg and the effects of the three-month strike at Inco's mines must have contributed to bring supply into better balance with demand, though the Canadian producer is still thought to have substantial stocks.

Whatever price movements may occur in the immediate future, it seems highly improbable that platinum prices will again go into a general decline, though it remains to be seen how soon the supply-demand picture will have changed sufficiently to permit the stepping up of production at the South African mines, which are believed to have disposed of the greater part of their stocks. Rustenburg's declared policy is to adjust production to demand, which certainly implies stepping up production as soon as the market situation warrants.

WORLD ALUMINIUM CAPACITY AND DEMAND IN 1961

Speaking before the Chicago chapter of the Society of Security Analysts, Mr. Dana T. Bartholomew, vice-president and chief financial officer of Aluminium Ltd., expressed the view that there was about one chance in three that demand for aluminium would match capacity by 1961. Mr. Bartholomew pointed out that foreign consumption had been rising at a much faster rate during the past decade than in the U.S. Usage in the U.S. increased by about 51 per cent in the 1950-58 period, but in eight other countries—the U.K., France, Germany, Italy, Japan, Canada, Norway, and India—consumption increased 119 per cent in the same period. In round figures, combined consumption by the eight foreign countries rose from about 500,000 tons in 1950 to 1,100,000 tons for 1958; during the same period usage in the U.S. rose from 1,200,000 tons to an estimated 1,800,000 tons (exclusive of shipments to the U.S. Government stockpile).

Last year, Mr. Bartholomew continued, primary aluminium production (less sales to the government) in the U.S. amounted to a little more than 1,200,000 tons, and in the next few years the domestic capacity is planned to exceed 2,600,000 tons.

As for the Iron Curtain countries, it is estimated that last year's apparent output of 700,000 tons will increase to the estimated capacity of 1,100,000 tons in the early 1960s; in all other countries, from 1,500,000 tons to about 2,000,000 tons.

In 1961, total world capacity may be expected to amount to about 5,600,000 tons as compared with the currently estimated 4,500,000 tons.

*

Primary aluminium production in the U.S. continued to edge upward in January to establish a new monthly record. January output by the six domestic producing companies was reported by the Aluminium Association as 156,708 s.tons, representing an increase of 3 per cent from December and 12 per cent over January, 1958. This was the second consecutive month in which U.S. output of virgin aluminium achieved a new record. December production was reported at 152,301 tons, breaking the previous record of 151,624 tons set up in July, 1956. The new record was established with the primary industry operating at approximately 83 per cent of its effective installed capacity of 2,200,000 tons p.a.

The report of Péchiney's board to an extraordinary shareholders' meeting in Lyons on February 20 indicated that the project to build an aluminium plant in Fria (Guinea) was to be continued, and that the plant was scheduled for completion by 1960.

*

According to the newspaper *Sovetskaya Rossia*, a new aluminium plant in Stalingrad will be able to produce 34 per cent more aluminium per kWh. than older refineries. The report stated that the new plant, which went into production on January 26, would be the largest aluminium smelter in the country by next year, when all its machinery was installed. It would account for much of the planned tripling of aluminium production in the Soviet Union during the period covered by the new seven-year plan. (It has been estimated that by the end of the current seven-year plan, in 1965, aluminium output in the U.S.S.R. will be running at about 1,600,000 tons per year.)

*

Kaiser Aluminium and Chemical Corporation recently announced prices on aluminium conduits averaging only 2 to 3 per cent higher than those of comparable steel items. Mr. J. T. Dugall, general manager of Kaiser's electrical conductor division, asserted that the lower price schedule made aluminium more economical than steel, because it was only one-third the weight, which resulted in substantial savings in handling.

*

Sumitomo Chemical Co. has announced that its production of primary aluminium will be increased by 3,900 tons to 23,050 tons this year. The output, at its new level, would account for more than 24 per cent of Japan's output of the metal, which is expected to amount to about 95,000 tons in the next financial year, starting in April.

IMPERIAL SMELTING CORPORATION PIONEERS BERYLLIUM METAL

Imperial Smelting Corporation, the U.K. subsidiary of Consolidated Zinc Corporation, have announced their plans for the production of nuclear grade beryllium metal. For a number of years this company has been investigating, under contract to the U.K. Atomic Energy Authority, a thermal reduction method. This work has been successfully concluded, and beryllium metal of the highest quality has been produced.

The company is now commencing commercial production, and new plant is being installed at Avonmouth. The first stage for the production of limited quantities of nuclear grade beryllium metal will be in operation by the end of this year. A second stage will involve considerable expansion and awaits confirmation of the anticipated demand for beryllium metal in connection with the development of the advanced gas-cooled reactor.

This plant will be the first commercial production unit in the U.K. for virgin beryllium metal.

WROUGHT RHENIUM

Commercial production of wrought rhenium rod, wire, and strip, is now under way at the Research Development Department of Chase Brass and Copper Co., a subsidiary of Kennecott Copper Corporation. Chase is reported to be the only producer of wrought rhenium, which may find important commercial applications. Production capacity in the

U.S. may reach about 25,000 lb. per year. A price range from $680 to over $2,000 per lb. is reported in the *American Metal Market*.

With a melting point of 5,756 deg. F., surpassed only by one metal, tungsten, and one non-metal, carbon, rhenium finds its most important use in high-temperature technology. Thermocouples of rhenium and tungsten make possible measurement and control of temperatures up to 4,500 deg. F. While not a structural metal, rhenium holds great promise as a possible welding material for molybdenum. When used for electrical contacts, rhenium has shown superior properties, as also in electronics.

TURKISH CHROMITE EXPORTS

Private exporters of chrome ores in Turkey have approached the government's Chrome Ore Committee with a request to increase the export bonus for chrome ore, which is at present 210 piastres per dollar to 620 piastres as for all other exports. The exporters argue that, in view of rises in wages and freight costs, prices of Turkish chrome ore are no longer competitive on foreign markets.

Hitherto, the government has rejected any applications of this nature, stressing that export bonuses cannot be changed.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

Although copper values have shown a further useful advance during the past week the strength of the tin market following the communiqué issued at the end of the International Tin Council's meeting in London has perhaps provided the most interesting feature. Lead and zinc have been quiet and show no significant change.

COPPER PRICES ADVANCE

Continued good advices from the U.S. and the expectation of a further advance in the customs smelter quotation to 31 c. which materialized on Tuesday, have contributed to the firmness in London.

As a result of limited offerings, scrap copper is also 1 c. higher during the week at 25¼ c., the highest price for nearly two years. At the higher level, business continues very satisfactory, whilst the producers who are still quoting 30 c. are reported to have closed their books for March. There are as yet no indications of an imminent rise in this price.

Although fabricators report good business, the main factor behind the advance, not only in the physical market but also on Comex in the U.S., is undoubtedly the possibility of a strike in the middle of the year when the current wage contract expires.

Imports of copper into the U.S. increased sharply in November to the extent that for the first time for four months the U.S. became a net importer. Compared with October's figure of 27,529 tons for all grades, November totalled 47,174 tons. On this side, outside demand has not been impressive, but it is believed there has been some business concluded with the Eastern *bloc*, including sales from the Continent to China.

The Cerro de Pasco Co.'s mines and smelting operations in Peru have been brought to a standstill by strike action. Copper output there is estimated at some 45,000 tons annually. The unrest in Africa has been another factor which the market cannot ignore considering the possible consequences inherent in any spread of the disturbances.

The Belgian copper price has been increased during the week and is now equivalent to 29.95 c. New York/Antwerp. In spite of a further increase in U.K. stocks of 635 tons to 6,970 tons, there has been a tendency for a small backwardation to appear.

DESPITE QUOTA INCREASES TIN REACHES £780

The communiqué from the International Tin Council was released late on Friday after business hours. The main points were the decision to increase by 3,000 tons to 23,000 tons the producer countries' export quota for the second quarter of 1959, and the extension until the end of the sixth control period of the authority previously granted to the buffer stock manager to operate within the £780 - £830 price range. The increase in the export quota is equivalent to 15 per cent and brings it back to the level ruling prior to October, 1958.

A certain amount of surprise was felt at this decision and the market staged only a short-lived reaction on the realization that the additional 12,000 tons over a year would still produce a deficit between production/consumption of fully 18,000 tons. By the middle of the week both cash and forward metal were quoted over £780. Undoubtedly, the producer countries were able to put up a strong case for some relief from the severe curtailment of production during the past six months, the more so as it was announced that a substantial part of the special fund had been sold. As soon as this has been completely liquidated a further official announcement will be made.

Meanwhile, the tonnage held in the regular buffer stock at the end of September last was 23,350 tons and the trade will wait with interest the buffer stock manager's actions regarding sales of this now that the market has at long last reached its lower selling limit. The next meeting of the Council is scheduled for May 26 in Copenhagen. It may be noted here that the present agreement expires in June, 1961, and it is intended to call a conference next year under U.N. auspice to draw up a fresh agreement and that membership would be open to all U.N.O. countries. As such, it was unlikely that new members such as, for instance, U.S., Japan or West Germany, would participate in the present agreement.

As regards the physical market, demand from the U.S. continues very satisfactory and in the U.K. warehouse stocks again declined last week by 253 tons to 13,485 tons. In spite of this, however, the London market still maintains a £2 contango.

On Thursday morning the Eastern price was equivalent to £830 per ton c.i.f. London.

U.S. LEAD-ZINC QUOTATIONS REDUCED

The Cerro de Pasco strike had a limited effect on lead and zinc where output has been running, in the case of lead, at an annual rate of 75,000 tons and in the case of zinc at about 37,500 tons plus about 70,000 in concentrates. In spite of this, the Canadian lead price was reduced early in the week to be followed immediately by a ½ c. reduction in the U.S. quotation to 11 c. per lb. New York as a result of the recent quietness of the market. London, having already largely discounted this, showed little change.

Zinc demand, particularly prime western grade, has been satisfactory, and although this metal is statistically in a more favourable position than lead, the weakness in the latter contributed to the ½ c. reduction in the zinc price to 11 c. per lb. New York. Speaking in connection with the import quotas, the U.S. Secretary of the Interior has stated his opposition to their removal under present circumstances, as it was not his intention to do anything that would give these industries less help than they were receiving at present. Output of recoverable zinc in the U.S. during 1958 at 403,000 tons was 24 per cent less than that of 1957 and the lowest annual rate since 1933. However, the introduction of the quota system in October led to a slight increase in mine production during the last quarter of the year.

U.K. DECEMBER STATISTICS

Figures issued during the week show that U.K. usage of copper in all forms for December totalled 56,698 tons compared with 60,219 tons in November and stocks of refined copper amounted to 64,184 tons at the end of December compared with 69,023 tons a month earlier.

Lead consumption during December at 27,154 tons showed a slight decrease from November's figure of 28,786 tons and stocks at 45,577 tons showed a substantial increase over the previous figure of 35,335 tons.

The offtake of zinc in December at 26,042 tons was almost unchanged compared with November's 26,432 tons. U.K. stocks at the end of December at 37,094 tons were slightly up on November's figure of 35,396 tons. Tin consumption in December showed a small increase of 7 tons over November's total of 1,795 tons. Stocks at the end of December were 19,054 tons compared with 19,285 tons a month earlier.

Closing prices are as follows:

	Feb. 19		Feb. 26	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£237½	£237¾	£240½	£240¾
Three months ..	£237	£237¼	£239¾	£240
Settlement ..	£237½		£240½	
Week's turnover	10,350 tons		10,100 tons	
LEAD				
Current ½ month	£70	£70½	£69	£69½
Three months ..	£71¼	£71½	£70½	£70½
Week's turnover	5,425 tons		6,350 tons	
TIN				
Cash	£772	£772½	£783½	£784
Three months ..	£774	£774½	£785	£785½
Settlement ..	£772½		£784	
Week's turnover	1,315 tons		1,180 tons	
ZINC				
Current ½ month	£74½	£74¾	£74½	£74½
Three months ..	£72½	£73	£72½	£72½
Week's turnover	5,825 tons		5,150 tons	

London Metal and Ore Prices appear on inside back cover.

Mining Finance

1986 And All That

A year ago, Lord Robins, president of the British South Africa Co., forecast savings of £1,000,000 per annum in a normal year as a result of Chartered's qualification as an O.T.C.

Soon after his statement appeared the flat rate of profits tax was introduced, and it is now apparent that since Chartered will always need to retain a large proportion of profits, the ambidextrous revenue authorities will take back about £400,000 of the O.T.C. saving.

The effect of this on dividends, however, will probably not be significant. Chartered's policy for some years past has been to distribute only a small proportion of earnings, the remainder being used to build up a strong portfolio of mining and non-mining shares against the time in 1986 when its royalty income from the Copperbelt producers will cease. Thus even in the 1958 financial year, when consolidated net profit was reduced from £4,830,496 to £4,363,217, the unchanged 4s. 6d. dividend was almost twice covered. The main effect of the reduction in tax savings will, therefore, be felt in a slight reduction in the rate at which the portfolio can be extended, and only indirectly by shareholders.

It is interesting to note the way in which the share of Chartered's revenue, represented by investment earnings (including commission), has grown. In the 1956 financial year, the ratio between this revenue and royalties was about 1 : 3.9. The following year this had changed to 1 : 2.5, and the results for 1958 show a ratio of almost exactly 1 : 2.0. These figures are obviously vitiated to some extent by extraneous factors—for example, a fall in copper prices such as happened during the three years in question would be reflected in the royalties immediately, whereas the effect on investment income might well be delayed into the following year's accounts. Nevertheless, the built-in growth factor is evident, and is of the utmost importance for the future.

This growth rate is not, of course, due to copper dividends, which have been severely cut in the past two years. There can be little doubt but that the main factor has been the Kaffir portfolio acquired comparatively cheaply, and valued in the market eighteen months ago at over £7,500,000. Regrettably, the present value of these shares has been omitted from the current report. It is certain, however, that it is now considerably higher than £7,500,000, and in all probability £10,000,000 would be nearer the truth.

The growth of the Kaffir section of its portfolio throws into the light another important aspect of Chartered's policy. Unlike most private investors, Chartered can afford to take a very long view of the market, and, with 1986 ringed in red on the calendar, circumstances required it to do so. At the same time, the income from royalties, and, increasingly, from the portfolio is sufficient to pay satisfactory dividends, while leaving sufficient in the kitty to build up reserves and expand shareholdings. Taking a twenty-seven year view, at some time or other any given share will be cheap—and Chartered can afford to wait for that day. Thus, the last year has seen the company in the market for copper shares—by book value these now represent 37 per cent of the total against 28 per cent last year—while other sections of the portfolio, notably the Canadian- and American-flavoured shares held through the Rhodesia Railways Trust, had barely changed. By 1986, therefore, Chartered is going to hold a portfolio of quite exceptional strength, which, of course, is one of the reasons for the notable institutional interest in the shares.

Considering all these factors, it is something of a surprise to find Chartered quoted at only 85s. to yield over 6 per cent. This is partly an expression of the long-term nature of the shares, expressed in the comparatively small percentage of earnings distributed in a normal year. On the other hand, a rough asset valuation indicates that the present share price is more than 50 per cent backed by investments, so that mineral royalties for the next 27 years are valued at barely £2 per share. The market is taking an over-pessimistic view of the course of copper prices during this period if this valuation means anything at all.

MESSINA'S COSTS ARE £120 PER TON

With admirable alacrity, Messina (Transvaal) Development Co. published its results and dividend only one month after the accounts closed on September 30 last. The full report published this week is, therefore, of interest mainly from the technical point of view.

It is almost a truism to say that, granted a good ore occurrence, the greatest asset any mine can enjoy is a live management. The concentrator plant results for the Messina mine itself give a clear indication of the effect such an asset can have on operations. This concentrator did not have an altogether untroubled year; among other things there was a relative increase in the amount of oxidic ore treated, which depressed recovery by more than 1 per cent. At the same time a lower grade of mill feed reduced the grade of concentrates by a small amount. Yet in spite of this, the cost per ton of recoverable copper fell by £11 to £120.

The most notable event of the year at the two mines operated directly by Messina was probably the proving at Umkondo of an unexpected large tonnage of oxide ore in a body which follows the outcrop of the workings. It is thought that the body will be mineable by opencast methods. The availability of this large, and probably cheap, new source will assist in countering the expected reduction in ore grade resulting from a decline in the proportion of ore won from the rich upper and middle shale bands.

The fall in the copper price has meant that expenditure on Messina's outside prospects had to be curtailed to some extent last year. However, geophysical and geochemical work continued, while on the Sanyati copper-lead-zinc prospect a shaft has been sunk to 100 ft. in what is hoped will be the sulphide zone. Underground prospecting from the shaft will be undertaken in due course. In the meantime, ore reserves so far located at Sanyati amount to more than 1,000,000 tons averaging 1.4 per cent copper, 1.35 lead and 2.85 per cent zinc.

MORE CASH FOR COCKLE CREEK

Cockle Creek in New South Wales is the home of the chemical plant operated by the Sulphide Corporation, a subsidiary of the Consolidated Zinc Corporation.

In last year's review, Mr. L. B. Robinson, chairman of Consolidated Zinc, referred to the progress being made with the design and planning of a new works at Cockle Creek which will produce 47,000 tons per annum of zinc by the process developed by the Imperial Smelting Corporation. At the same time, he announced a decision to replace the zinc distillation plant at the Swansea Vale works by the Imperial Smelting process by the end of 1960.

It is probably to satisfy the capital appetite of these two projects that Consolidated Zinc is to make a one-for-six rights offer to shareholders at a price yet to be determined (on the basis of present market prices it is expected to be in the region of 48s. per share). There are, of course, many other claims on Consolidated Zinc's resources, notably the development of the Cape York bauxite deposits, and some of the £3,500,000 to be raised will no doubt find its way into these other projects as well.

BLIND RIVER RESULTS FOR 1958

Results for 1958 of the Blind River uranium producers of the Rio Tinto group are summarized in the table below.

		1958 *$000*	*1957* *$000*
Algom			
Net Profit	...	9,334	6,766
Funded Debt	...	25,182	38,900
Preston E. Dome			
Net Profit	...	125	90
Funded Debt	...	—	—
Pronto			
Net Profit	...	2.716	2,471
Funded Debt	...	1,893	4,523
Rix-Athabaska			
Net Profit	...	300	L 273
Funded Debt	...	—	—
Milliken Lake			
Net Profit	...	L 998*	
Funded Debt	...	27,875	
Northspan			
Net Profit	...	L 5,067*	
Funded Debt	...	91,208	

L Loss. * Six months.

Of these six mines, only Pronto and Rix-Athabaska have so far reached the dividend-paying stage. Pronto paid a maiden dividend of 75 c. per share in December, while Rix-Athabaska, which supplies the largest individual tonnage to the Lorado custom mill, declared a first payment of 5 c. per share in January.

The next mine to reach this stage will almost certainly be Algom. Mr. W. H. Bouck, Algom's president, recently stated that by the end of March it was hoped that the company would be completely clear of debt. However, he added that it was still too early to say what dividends would be paid, and when.

BETTER MOUNTAIN COPPER PROFITS IN 1958?

As a result of representations by shareholders, the Mountain Copper Company has issued an interim statement to bridge the gap between the end of the company's financial year and the publication of the annual report.

The statement reveals that results, broken down into pyrite sales and chemical operations, showed a complete reversal of the previous year's trends. Pyrite sales, derived from the subsidiary company's operations at Shafta, fell well below normal in spite of the drastic reorganization which was the main factor in maintaining profits last year. In contrast, the chemical plant at Martinez, which by virtue of its products (including copper salts, sprays, fungicides, and fertilizers) was expected to feel the effects of the recession more strongly than Shafta, had a good year.

Excluding the dividend expected from the San Francisco Chemical Company, therefore, it is thought that consolidated profits for 1958 will be rather better than in the previous year, when a dividend of 6d. per share was declared from earnings of £3.040, bolstered by write-backs of £34,600.

KLERKSDORP'S UNWANTED URANIUM

The South African Atomic Energy Board has once again rejected the application by Klerksdorp Consolidated Goldfields to be admitted as a uranium producer. A letter from the board's acting secretary to the company's resident director in the Union says that no indication could be given as to whether it would be possible to admit Klerksdorp Consolidated as a uranium producer in the future. "The present accepted uranium producers", reads the letter, "produce more than sufficient uranium for the Board to meet its present contracts".

Development and drilling on the company's Rhenosterhoek property have disclosed reserves of 1,648,800 tons at the high value of 1.59 lb. per ton. The nature of the occurrence would permit selective mining, and this, coupled with sorting, could raise the grade recovered at the mill well above this figure, thus enabling a small plant to be built at a comparatively low capital cost.

Rhenosterhoek is at present on a caretaking basis.

FINANCIAL NEWS AND RESULTS IN BRIEF

Tweefontein to Repay Preference Capital.—Subject to approval at an extraordinary meeting to be held on March 18, Tweefontein Colliery proposes to repay its 75,000 cumulative preference shares of £1 each at a premium of 3s. 6d. per share. The surplus capital available for this repayment arises from a similar step recently taken by Tweefontein United Collieries.

Wider Market for Kaffirs.—It is expected in Frankfurt that Anglo American Corporation shares will soon be admitted to official dealings on West German stock exchanges. The shares to be dealt in will be those resulting from conversions of last September's 50,000,000 DM. convertible bond issue. There may also be a market in the bonds themselves.

Offer For Tin Fields of Nigeria.—Tin Fields of Nigeria have received an offer of 6d. per share for the whole of the issued capital. Negotiations are proceeding, and it is hoped to let shareholders know the outcome in the near future. Tin Fields' property is at present on a care-and-maintenance basis, the company's quota being produced by Naraguta Extended Areas under grouping arrangements.

Alpine Barberton.—Alpine Barberton made a loss of £1,975 in the year ended June 30 last, compared with a loss of £942 in the previous financial year. The directors say that their negotiations for the acquisition of a fresh mining enterprise in the Union have so far proved unsuccessful. Efforts in this direction will, however, be pursued. Meeting, March 25.

Camp Bird E.G.M.—The extraordinary general meeting of Camp Bird, recently referred to in this column, will be held on March 9. Two resolutions will be considered. The first, a special resolution proposed by the present board, recommends that the affairs of the company be investigated by a B.O.T. inspector under Section 165 of the Companies Act 1948. The second, an ordinary resolution, proposes the appointment of Messrs. J. C. George, H. A. Benson and H. L. Layton as a shareholders' committee empowered to investigate Camp Bird's affairs.

South African Townships.—Net profit after tax of South African Townships Mining and Finance in the year ended September 30 last was £367,035, an increase from £225,594 in the preceding twelve months. Of this, £240,000 was absorbed by the dividend of 1s. per share, twice the 1957-8 distribution. At the year-end, the market value of S.A. Township's investments had increased from £4,615,485 to £5,770,617. Meeting, Johannesburg, March 10. Mr. A. Wilson is chairman.

Borax Profits Sharply Lower.—Net profit attributable to Borax (Holdings) in the year to September 30, 1958, dropped to £573,976 from £1,203,237 in 1956-7. This was due to problems connected with the beginning of operations at Boron, California, coupled with overproduction in the potash industry. Meeting, March 11. Lord Clitheroe is chairman.

Anglovaal Charterland Co. — The Anglovaal Charterland Exploration Co., which is prospecting over the North Charterland Exploration Co.'s mineral concession in Northern Rhodesia, is reported to be examining the old Sesare mine 40 miles north of the Fort Jameson road. At one time this property was an important gold producer.

MARKET HIGHLIGHTS

The week's outstanding feature in S.A. gold shares, was the strong renewal of interest in Free State Geduld. Johannesburg came in as buyers at the beginning of the period and, with London support, Wednesday night saw the shares at a new high of 153s. 1½d. after having risen 3s. 9d. on the day. Other Golds pursued a mixed course at first, but by the end of the week most issues were firm, with Western Holdings (140s. 7½d.), Ofsits (93s.) and Buffels (50s. 6d.) well to the fore. Hopes of good results from Freddies' drilling operations lifted this share to 11s. 1½d., while pressure on a bear position helped West Drie to pass its 1954 peak at 125s. 7½d. A rise of 1s. 6d. in Blyvoor (25s. 7½d.) was attributed to belated realization that the new shaft will not depress dividends.

Finance houses followed the see-saw course of the rest of the market. An exception was Rand Selection (51s. 9d.) where a reassessment of the company's prospects following the publication of the accounts was responsible for a ten-year peak of 52s. at one time. Johnnies (59s. 6d.) were also a firm spot, reflecting the strength of Platinums. By Wednesday, however, the general buoyancy of the market was felt in this section, and there were buyers for Anglo American (181s. 3d.), Central Mining (78s. 9d.) and others.

As a result of the increases in the metal price, Platinums showed strong features at the beginning of the week. Their strength was sapped by end-account profit-taking on Tuesday, however, and the section finished the week no more than steady. In spite of this, the initial rises were maintained and Pots (8s. 7½d.), Waterval (13s. 9d.), Union (12s.) and Lydenburg (9s. 9d.) all showed gains.

De Beers were a strong counter throughout, closing the week more than 3s. up at 134s. 4½d. This was based on hopes that the dividend due shortly will raise the year's total above the 10s. paid each year since 1951.

In Coppers, Chartered fluctuated between wide limits. Last week's advance continued for a while and the shares reached 85s. 9d. There followed a wave of profit-taking, but the publication of the annual report attracted fresh buyers and the final quotation was 85s. against 82s. at one time. Other Copperbelt issues were dull with the Nvasaland disturbances causing uncertainty. Mangula (10s. 6d.) was also hesitant, but Messina reacted well to the good annual report, closing 3s. 6d. higher on balance at 115s. 7½d. U.S. interest was reported in Tanks (52s.).

Tins were comparatively little affected by the increased quotas, and even the strength of the metal after the relaxation failed to stimulate much interest. Ipoh (14s. 6d.), Rambutan (14s.) and Malayan (14s. 9d.) were in demand from time to time. There were calls for Beralt (25s. 6d.) on talk of a better outlook for wolfram.

Following the issue proposals, Consolidated Zinc lost 2s. 3d. and closed the week 2s. 6d. down at 60s. 9d.

Option business in the mining sections ranged over a wide selection of securities. Among Coppers, business was done in Chartered, Bancroft and Rhokana, while business in gold options was centred on F.S. Geduld, St. Helena, Ofsits, and Zandpan.

MINING MISCELLANY

Engineers at the Commonwealth Government's Aeronautical Research Laboratories in Melbourne believe that a successful method has been found of utilizing Victorian brown coal as a turbine fuel. Experiments are also being made in the use of various types of black coals as fuels for gas turbines.

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Claiming that Scotland's mineral resources are not being sufficiently exploited, Mr. Richard Rumbold, a director of Radiometric and Geophysical Surveys Ltd., has suggested that small mines should be established throughout the country. Using modern geophysical techniques, it would be possible to make an initial exploration without disfiguring the countryside. According to Mr. Rumbold, there are valuable deposits of chromite in Shetland, nickel deposits on the west side of Loch Fyne, and other minerals in Islay, Perthshire, and elsewhere in the north of Scotland.

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The United States Government has released from its national industrial reserve six Government-owned war-time industrial plants representing nearly all that is left of the war-time magnesium production complex. These six plants will be put up for sale by auction provided no governmental agency exercises a preferential claim. Representing a government capital investment of some $54,000,000, the six plants were built to achieve a capacity of 67,000 tons of primary magnesium a year.

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Superior flint clay from Negev deposits with a higher alumina content (40 to 60 per cent) than raw materials from regular sources may soon be exported to many European countries where refractory materials plants are introducing various technical modifications. This was announced recently by Mr. Y. Eilan, managing director of the Negev Ceramic Materials Co. Ltd., in Beersheba. Mr. Eilan stated that in Holland, France, Italy, and West Germany, experiments had been carried out on the Israel flint clay. The company is stockpiling some 30,000 tons in preparation for the near future, when large-scale exports will start in Europe. The Israel flint clay is being mined in the Makhteesh-Ramon region of the central Negev.

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Control of Pickle Crow Gold Mines has been purchased by Lamaque Gold Mines from Goldfields Uranium Mines, and the sale has been approved by the Toronto Stock Exchange. It involves 800,000 Pickle Crow shares for a total cash consideration of $824,000. All three companies are controlled by the Dr. N. B. Keevil Group (*vide The Mining Journal*, February 20, page 198).

★

At Petauke, in the Eastern Province of Northern Rhodesia, deposits of graphite which might be large enough to be worked economically have been confirmed by the Northern Rhodesia Geological Survey Department. The discovery was made last December by geologists carrying out a detailed survey of Northern Rhodesia. The deposits are known to extend about two miles from where the original discovery was made a few miles north of Petauke. Samples were analysed in Lusaka and proved to be flake graphite of crucible grade. The current price of the grade analysed at Lusaka is reported to be £45 a ton.

★

Mr. Abul Kasem Khan, Industries Minister, has announced that the Pakistan Government will no longer insist on the participation of Pakistani capital in any industry started by foreign interests with the government's approval. Foreign capital in approved industries established after September 1, 1954, may in future be repatriated at any time to the extent of the original investment, while profits will be remittable to the country of origin of the capital. Hitherto the Pakistan Government has insisted that 51 per cent of shares should be held by Pakistanis in any enterprise started by foreigners. The Industries Minister also announced that within two months the government would set up an investment bureau to furnish information to foreign and local investors on all aspects of the government's financial and industrial policy to assist industrialists in securing facilities for the establishment of new undertakings. It was further stated that the government had no intention of nationalizing industries involving foreign capital, and that price control would not be a permanent feature of its policy. Tax concessions would be allowed to industries to provide incentive.

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India's output of iron ore during 1958 is estimated at 5,824,000 tons as against 5,074,000 tons in 1957. This represents an increase of about 15 per cent.

★

A new iron mining operation for Ontario will come into production on April 1, when operations will be resumed at the property of Lowphos Ore Ltd., at Moose Mountain, near Milnet. At full operation, the mine and plant will produce about 550,000 tons of high-grade ore concentrates annually. The concentrate will be shipped in the form of fines ready for sintering. Concentration will be by the magnetic process. The ore will be stockpiled during the winter. The opening of the plant, originally scheduled for the spring of 1958, was postponed because of the reduced demand for ore last year. However, before closing down enough of the overburden had been stripped to permit immediate mining this spring.

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In order to build a new flotation mill, the A/S Sulitjelma Gruber has been granted a loan of 5,000,000 NKr. (£250,000) from the government's promotion funds for Northern Norway. Total cost of the new mill has been estimated at 9,000,000 NKr. (£450,000).

★

The Folldal Verk A/S is planning to exploit the newly found orebodies of cupreous and non-cupreous pyrites at Hjerkinn to the north of its old mines. Extensive geophysical prospecting and diamond drilling have revealed ore reserves for eight to ten years of exploitation, and further prospecting will be carried on. The new mines will be situated close to the railway line, and can be exploited in a far more rational manner than the old mines.

★

The Allihies Copper Mines in West Cork, where work ceased about a year ago, may be reopened and dewatering work resumed. Officials of Can-Erin Mines Ltd. are on their way from New York to Ireland. Mr. A. A. Weiss, president of Can-Erin Mines, said in New York that copper ore assaying 9 per cent had been found in abandoned workings at Hungry Hill in West Cork, and he forecast that the two mines there would be back in working operation within two years. Can-Erin Mines Ltd. set up a subsidiary company—the Emerald Isle Mining Co. Ltd.—in Ireland about two years ago, when dewatering of the old mines in West Cork was begun.

PERSONAL

Mr. William G. Reynolds, vice-president, and Mr. Joseph H. McConnel, general counsel, have been elected executive vice-presidents of the Reynolds Metal Co. Mr. W. G. Reynolds is in charge of the company's research operations and is also president of Reynolds International Inc. Mr. McConnel was the Reynolds official in London during the struggle over British Aluminium.

★

Mr. Nicholas D. Thomas, of Lowenac, Camborne, Cornwall, has been appointed a director of Rambutan Ltd.

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The Consolidated Pneumatic Tool Co. Ltd. has appointed Mr. Gordon L. Dray as manager of its Oil Division, handling all the company's business in the petroleum field.

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Dr. Marcel Ballay, president and managing director of the Centre d'Information du Nickel, Paris, died on February 2, 1959, after a short illness. The loss of such a learned and respected scientist will be regretted in metallurgical and industrial circles in France and the United Kingdom. In 1928, Dr. Ballay joined the Centre d'Information du Nickel as technical manager. He became vice-president in 1950 and president in 1954, succeeding M. Jean Dhavernas.

★

Mr. John L. Deffenbaugh has been appointed manager of the new 650,000 sq. ft. tractor factory in Glasgow of the Caterpillar Tractor Co. Ltd. He succeeds Mr. J. R. Munro, who was elected a vice-president of Caterpillar's parent company in Peoria, Illinois, on May 19, 1958, and will shortly be returning to the United States.

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Mr. T. Nethersole, sales manager at the Ferrybridge office of the Philidas locknut division of Whitehouse Industries Ltd., is personally taking over the company's sales organization throughout London, Middlesex, Surrey, Kent, and Sussex.

★

Further appointments are announced in the new cables division of Siemens Edison Swan Ltd., as part of the company's reorganization. Mr. D. E. Beavan is home cable sales manager; Mr. R. G. Holland, export cable sales manager; Mr. D. G. Skinner, telephone cable sales manager; Mr. H. S. Peet, distribution equipment sales manager; Mr. J. A. C. Kendle, wiring accessories sales manager; Mr. J. C. E. Coomber, contract sales manager; Mr. R. B. Tucker, assistant home cable sales manager; Mr. H. E. Helwig, associations liaison officer; Mr. P. W. Kilroy, special projects sales manager.

After a lull, Southern Rhodesian chrome mining contracts recently have been renewed and there are signs of increased activity along the Dyke. The seams are mostly flat-dipping and narrow, in soft serpentine, and thus lend themselves to resue methods. The photographs appearing above, right, and below, left, are published by courtesy of the Southern Rhodesian Information Department. In both illustrations, the chromite seam can be seen. The method of coal drilling employed is clearly shown

Tecalemit, of Plymouth, have announced the following U.K. sales appointments: Mr. R. R. Parker as general sales manager, Mr. S. C. Kennett as deputy general sales manager, and Mr. D. M. Bruce as marketing manager.

★

Mr. A. Carr, deputy chairman of Thos. W. Ward Ltd., Sheffield, has been appointed chairman of three Ward subsidiaries. These are Thomas Smith and Sons (Rodley) Ltd., John Smith (Keighley) Ltd., and Widnes Foundry and Engineering Co. Ltd.

AGENCIES WANTED

The firm of Aster S.r.l., of Via di S. Erasmo 3, Rome, are interested in taking up agencies of U.K. manufacturers of pure electrolytic manganese and phosphorized copper (15 per cent phosphorus). Manufacturers interested should write direct to Aster S.r.l., notifying the British Embassy, Commercial Department, Villa Wolkonsky, Via Conte Rosso, 25, Rome, that they have done so. B.O.T. Ref. E.S.B. 2918/59. Telephone inquiries to Chancery 4411, extension 776 or 866.

CONTRACTS AND TENDERS

Formosa

An International Co-operation Administration (I.C.A.) procurement calls for a disc-type coal conveyor and spare parts. Project Implementation Order No. 84-21-455-9-80386. Issuing authority: Central Trust of China, Purchasing Department, 68 Yen Ping Nan Road, Taipei, Taiwan (Formosa). Closing date, March 13, 1959. B.O.T. Ref. E.S.B. 4123/59/I.C.A. Telephone inquiries to Chancery 4411, extension 354.

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India

Fine coal washing pilot plant. Issuing authority: The Directorate, Central Fuel Research Institute, P.O. Jealgora, Dhanbad. Closing date, April 27, 1959. B.O.T. Ref. E.S.B./3706/59. Telephone inquiries to Chancery 4411, extension 738 or 771.

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Four Divisions of the National Coal Board have placed orders for the new "Wigan" type 40 luminous shaft signalling indicator designed by Heyes and Co. Ltd., of Wigan.

Coming Events

The American Zinc Institute will hold its 41st annual meeting in Chicago, Illinois, on April 23 and 24. The first session will be in conjunction with the Galvanizers' Committee of the steel industry and the Lead Industries' Association. The second session will include a review of production and consumption of zinc in the United States and elsewhere.

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More than 9,000 exhibitors from forty countries are expected to attend this year's Leipzig Spring Fair on March 1 to 10, 1959, with its Technical Fair and Sample Fair sections. A total turnover target to the extent of 700,000,000 marks ($320,000,000) worth of goods in the form of buying and selling contracts concluded between the GDR and capitalist and socialist countries is envisaged for this year's Spring Fair. Equipment for the mining industry will take a foremost place. Owing to its great dimensions, the opencast mining equipment will be predominantly demonstrated as models in correct scales, but the exhibitors will spare no efforts to show visitors on request important parts and components as well as transportable machinery.

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A general meeting of the Cornish Institute of Engineers will be held at the School of Mines, Camborne, on March 11, 1959, at 7.15 p.m. The subject will be "Uranium: occurrence, exploration, analyses, concentration and extraction metallurgy". Papers will be given by Dr. K. F. G. Hosking, Mr. J. P. R. Polkinghorn, Mr. F. B. Michell, and Dr. B. A. Bannister.

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A total of 2,800 firms from twenty-seven different countries will participate in the forthcoming Utrecht International Spring Trade Fair, which will be held on the following dates: for consumer goods, March 9 to 14; for technical goods, April 15 to 24.

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The National Chemical Laboratory, D.S.I.R., will feature the work of its Corrosion of Metals Group at the Corrosion Exhibition to be held in the Horticultural Hall, Westminster, S.W.1, on April 27 to 30.

BARROW HEPBURN & GALE

CONTINUANCE OF DIFFICULT CONDITIONS

The 38th ordinary general meeting of Barrow Hepburn & Gale Limited will be held on March 19 in London.

The following are extracts from the Statement by the Chairman, **Mr. George W. Odey, C.B.E.**: It is our unfortunate experience that the leather trade is one of those industries that suffers immediately from anything in the nature of a recession of trade. The sole leather portion of our leather interests presented the most serious problem. The competition of synthetic soling materials has continued with increased severity, and has been intensified by the development of rubber moulded footwear which in some factories has eliminated the use of leather soling materials altogether.

One has only to recount that conditions in the sole leather industry have been such that since 1954 production has ceased in twenty sole leather tanneries, representing some 20 per cent. of the total trade capacity. In addition, a number of other sole leather tanners still in production are working at an uneconomic level, and under present conditions it seems highly probable that further closures may be expected. The position of our own sole leather tanneries was rendered yet more difficult by the fact that the closing of two of our largest competitors in the course of the year led to the disposal of their stocks of sole leather, so that many of our customers' normal requirements were filled up at least six months and in some cases a year ahead. Beneficial as the closing of these tanneries may be from the long-term point of view, the immediate effects upon our trading results for 1958 were quite disastrous.

Future of Sole Leather Industry

In assessing the future of the sole leather industry, we have to bear in mind that as a result of the very adverse conditions obtaining during the last twelve months, there has been a substantial reduction both in production and in stocks, which have decreased during the year by some 25 per cent. Provided tanners can be induced to exercise some restraint on the domestic hide market, and continue to maintain production at the reduced level of recent months, the industry may reach a state of equilibrium between supply and demand where sole leather can again be produced at a profit.

After reviewing the Group's activities at home and overseas, the Chairman said: Conditions in the sole leather industry continue unsatisfactory, but they cannot last in this state indefinitely. Either conditions will improve or more tanneries will go out of production. Whichever way events move we are, in our Company, geared to the production of leather and more particularly of sole leather. It is essential for the health of the group as a whole that our heavy leather tanneries should maintain a reasonable rate of production.

With regard to our tanneries generally, the Board can see no reason to depart from the policy which they have maintained through the recent difficult years, in the firm confidence that ultimately, the leather industry will emerge from the difficulties of recent years, strengthened and more efficient than ever. It is our firm intention to preserve our Company in full operation until such time as those more favourable conditions arrive.

Book Reviews

Rock Pressure in Mines, *by E. De St. Q. Isaacson. Published by Mining Publications Ltd., London. 212 pp. with illustrations and index. Price 45s.*

Faced by the growing demands of industry for metals of all kinds, the mining engineer of today is compelled to exploit the orebodies of the earth's crust at ever-increasing depths. In view of this trend, it is essential that he should have a more detailed and intimate knowledge of the nature of rock pressure and of the techniques of pressure control than was previously necessary. Only thus will it be possible to work deep-lying deposits with safety and freedom from costly interruptions due to collapse.

It is remarkable that, although technical papers upon the subject of rock pressure are widespread throughout the periodical literature, there has not yet appeared any textbook solely devoted to this important topic. It is believed, therefore, that *Rock Pressure in Mines* must fill a very definite gap in the standard works devoted to mining.

The book begins with a theoretical consideration of the stresses and strains which are developed about mining excavations. The effect of stresses beyond the elastic range receives special consideration, as do the modifications in the underground pattern of stresses which result from various types of non-homogeneity occurring in rocks, such as stratification and faulting. The author then proceeds with a logical discussion of the techniques of pressure control both from the point of view of design and layout of development and stoping, and also from the point of view of support.

Every effort has been made to develop the theoretical side of the subject along sound lines, but the approach is practical rather than academic, in that the necessary theory has been set out only as a foundation upon which to build up solutions to the practical problems which confront the mining engineer in his everyday work.

Chapters are included which deal with the instrumental investigation of underground stresses and strains, with rockbursts, and also with the analysis of various cases of rock failure and collapse which have actually occurred in mines known to the author.

An interesting feature of the book is an attempt to reconcile some of the conflicting ideas on rock pressures which have been put forth by various authorities in the past, and it is shown how dependent is the mode of failure on the structure of the rock considered, and how impossible it is to generalize from observations restricted to one particular type of rock alone.

The author is in charge of a research unit responsible for the investigation of pressure-control problems in the Kolar Gold Fields, which are now working below the 10,000 ft. horizon.

The Proprietors of British Patent No. 685,445 for "APPARATUS FOR CONTINUOUSLY DIGGING COAL", desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant or licences thereunder. Further particulars may be obtained from Marks and Clerk, 57 and 58 Lincoln's Inn Fields, London, W.C.2.

Year Book and Guide to Southern Africa, 1959 Edition. *Edited by A. Gordon-Brown, F.R.G.S. 750 pp. 16 pp. of illustrations, 28 pp. of plans and diagrams. A 48 pp. Atlas in colour and a folding road map of South Africa. Index. Robert Hale Ltd. 10s. 6d.*

Year Book and Guide to East Africa, 1959 Edition. *Edited by A. Gordon-Brown, F.R.G.S. 370 pp. 12 pp. of illustrations, 15 pp. of maps and plans. 16 pp. Atlas in colour. Large folding road-planning map and a folding map of Africa in colour. Robert Hale Ltd. 10s. 6d.*

Once again, the Union Castle Line has been responsible for the production of two excellent guides to Africa, in attractive, colourful covers. The Year Book guides have been carefully revised with the co-operation of government and other departments in Africa. Both guides have sections on mining, and the Southern Africa Year Book contains a feature on diamonds.

CRUSHING MACHINE DESIGNER

Old-established and well-known firm in the Crushing Plant Industry invites applications for permanent and progressive position as

DESIGN ENGINEER

which will shortly be coming available. This is a well-paid post calling for Specialist Engineer having substantial background connected with the practical design and operation of crushing machines for handling hard and medium ores and minerals. Applicants must have proven successful record over a number of years on this particular class of design work. Staff Pension and other facilities. Write to Box 633, *The Mining Journal Ltd.*, 15 Wilson Street, Moorgate, London, E.C.2.

SOUTHERN RHODESIA GOVERNMENT

VACANCIES: TWO ASSISTANT MINING ENGINEERS

DIVISION OF TREASURY AND MINES

Applications are invited for employment as Assistant Mining Engineers in the Mining Engineering Department. One vacancy is immediately available and the other will arise after October 31, 1959.

Minimum qualifications: A Degree, or Diploma in Mining Engineering of a recognized School of Mines or University and at least five years' practical experience in the mining industry.

Salary Scale: £700 x 100-£1,100 x 75-£1,250 x 50-£1,650 p.a., according to qualifications and experience.

Application forms and further information from the Secretary (R), Rhodesia House, 429 Strand, London, W.C.2. Closing date: March 21.